

tion of the district on the morning of the 13th for which warnings were issued on the morning of the 12th.

The Daily States of September 13, 1902, commenting on the forecasts and warnings, says:

The frost predicted for the northwestern portion of the cotton belt came just as expected. The gratifying feature is that no important weather changes take place without timely warning of their coming being given by the Weather Bureau, and the confidence which the people show in these warnings is not misplaced.

I. M. Cline, Forecast Official.

CHICAGO FORECAST DISTRICT.

A larger number of storms than usual for the season crossed the upper lakes. The storms, while not unusually severe, had greater intensity than is generally experienced in September. Warnings were issued well in advance of the gales, and no casualties of consequence have been reported. The first marked frost condition moved from the extreme northwest over the upper Mississippi Valley and the upper Lake region from the 3d to the 5th. On the 12th and 13th frost occurred practically throughout the entire district, freezing temperatures occurred in the western portion of the district, and the frost was heavy as far east as the Ohio Valley. Frost of less consequence occurred at other times during the first and second decades of the month. Warnings were issued well in advance of the frosts.—*H. J. Cox, Professor.*

DENVER FORECAST DISTRICT.

Timely warnings were issued for the first severe frost of the season which occurred in Wyoming and eastern Colorado on the morning of the 12th; also for the heavy frost of the 27th in Utah and the lower Arkansas Valley. Notices of light frost were included in the forecasts.—*F. H. Brandenburg, Forecast Official.*

SAN FRANCISCO FORECAST DISTRICT.

The month as a whole was an unusually quiet one. Dense smoke prevailed from about the middle of the month for a period of a week or more. The smoke was due to extensive forest fires in the northern Pacific coast States.—*A. G. McAdie, Professor.*

PORTLAND, OREG., FORECAST DISTRICT.

The only special feature of the month was a storm which swept across the district on the 26th, in connection with which shipping interests were given ample warnings. Sharp frosts occurred frequently during the latter portion of the month, and as a rule they were accurately forecast.—*E. A. Beals, Forecast Official.*

RIVERS AND FLOODS.

The rivers, as a rule, conformed to the usual periodical custom, and fell steadily during the month except along the eastern slope of the Appalachians, where heavy rains about the end of the first decade caused a general though not particularly marked rise. Still heavier and more general rains dur-

ing the last few days of the month caused another rise which was much more pronounced along the Susquehanna River, but not so much so as farther south.

In the upper Mississippi and the Ohio rivers the low stages seriously interfered with navigation. The last through boat for St. Louis left St. Paul on the 24th, while on the Ohio navigation was practically suspended north of Cincinnati, only a few local boats remaining on the river. Navigation on the upper Tennessee was also suspended until the heavy rains of the last week of the month afforded some relief.

The highest and lowest water, mean stage, and monthly range at 143 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.*	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.										
I.....	1, a. m.	41	101	4, a. m.	46	60	Miles. 2,250	Days. 4.0	562	Miles. 23.4
II.....	2, a. m.	52	122	6, p. m.	46	60	3,600	4.5	800	33.3
III.....	5, p. m.	47	123	9, a. m.	46	60	3,550	3.5	1,014	42.3
IV.....	8, a. m.	49	124	12, p. m.	46	60	3,800	4.5	844	35.2
V.....	10, a. m.	51	120	17, p. m.	46	60	3,800	7.5	507	21.1
VI.....	16, a. m.	51	114	19, a. m.	47	84	1,800	3.0	600	25.0
VII.....	20, p. m.	47	123	21, p. m.	47	97	1,250	1.0	1,250	52.1
VIII.....	22, p. m.	51	104	26, a. m.	45	67	2,000	3.5	571	23.8
IX.....	28, p. m.	47	123	30, a. m.	34	102	1,400	1.5	933	38.9
Sums.....							23,450	33.0	7,081	295.1
Mean of 9 paths.....							2,606		787	32.8
Mean of 33.0 days.....									711	29.6
Low areas.										
I.....	1, a. m.	54	114	5, a. m.	48	60	3,000	4.0	750	31.2
II.....	3, p. m.	51	120	6, p. m.	48	84	1,700	3.0	567	23.6
III.....	6, p. m.	51	114	10, a. m.	48	68	2,250	3.5	643	26.8
IV.....	10, p. m.	35	106	14, a. m.	47	65	2,975	3.5	850	35.4
	12, a. m.	36	87				1,600	2.0	800	33.3
V.....	15, a. m.	50	110	17, p. m.	46	87	1,150	2.5	460	19.2
	18, a. m.	51	120	18, p. m.	29	89	2,200	3.5	629	26.2
VI.....	18, a. m.	39	120	24, p. m.	38	90	3,300	6.5	508	21.2
VII.....	24, p. m.	51	114	29, a. m.	42	71	3,250	6.5	500	20.9
VIII.....	24, p. m.	51	114	29, a. m.	42	71	2,650	4.5	589	24.5
	27, p. m.	41	118	*1, p. m.	41	70	2,900	4.0	725	30.2
Sums.....							26,975	43.5	7,021	292.5
Mean of 11 paths.....							2,452		638	26.6
Mean of 43.5 days.....									620	23.8

*October.

For graphic presentation of the movements of these highs and lows see Charts I and II.—*Geo. E. Hunt, Chief Clerk Forecast Division.*

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following summaries relating to the general weather and crop conditions during September are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau:

Alabama.—The month was too wet for maturing cotton, much of the open cotton being damaged by rain; light frosts occurred in northern and north-central counties about middle of the month, doing no damage; rains beneficial to minor crops and for fall seeding.—*Thomas Crawford.*

Arizona.—Conditions were unusually favorable for farming operations and crop development throughout the month. Showery weather that

began during the first week, extended well into the third decade. The water in the irrigating canals was ample for all requirements. The soil was moist and mellow for fall plowing and seeding during the latter part of the month and this work was in active operation. On account of the seasonable weather an increased acreage will be sown in alfalfa and small grain.—*Wm. G. Burns.*

Arkansas.—The drought continued practically unbroken, except by light and widely scattered showers during the first decade. Cotton deteriorated in all sections, being seriously damaged by excessive heat, rust, and bollworms; it opened rapidly and prematurely, but picking was delayed by the hot weather and scarcity of labor. Late corn was